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Job No. CTCE/BBMP/WMM/05/KRIDL/WMM/AIV/2014-15 10.04.2014

Aggregate Impact Value

IS: 2386 Part IV

Customer	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	Technical Manager (West), KRIDL, Bangalore.
Name of the Work	Improvements of balance roads and drilling of borewells in G. Ramaiah Layout & Virat Ward No. 05 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore
Reference	BBMP/AEE/YSSD/475/2013-14 Dated: 12.02.2014
Source / Location	WMM Plant
Type of Mix:	Wet Mix macadam
Date of Testing	10.04.2014

Sl. No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	381	383	
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	80	84	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	301	299	
4	Aggregate Impact value = percent finer (i.e. $W_2 - W_3$)%	21.00	21.93	21.46

Conclusion:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

Note:

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Job No: C/CT/BBMP/WNo.03/KRIDL/WMM/ST/2014-15 10.04.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, Bangalore
Name of Work	Improvements of balance roads and drilling of borewells at G. Ramaiah Layout in Attur Ward No. 03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/475/2013-14 Dated: 12.02.2014
Technical Reference	IS:2386(Part I)-1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	10.04.2014

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Result : Flakiness Index = 11.52%

Elongation Index = 13.67%

Result : Combined Flakiness & Elongation index 25.19%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

Note:

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Job No:CTCE/BBMP/WNo.03/KRIDL/BC/03/2014-15 24.04.2014

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

CLIENT	:	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
AGENCY	:	Technical Manager (West), KRIDL, Bangalore.
NAME OF THE WORK	:	Improvements of balance roads and drilling of borewells in G. Ramaiah Layout in Attur Ward No. 03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
REFERENCE	:	BBMP/AEE/YSSD/475/2013-14 Dated: 12.02.2014
SAMPLE ID	:	Bitumen
PERIOD OF TESTING	:	24.04.2014

The results of the tests conducted on the bitumen sample using for Bituminous Concrete.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 °C, 1/10 mm	IS :1203 - 1978 (RA-2009)	65	60 to 70
2	Softening point, °C	IS :1205 - 1978 (RA-2009)	46	Min. 45
3	Ductility at 27°C, cm	IS :1208 - 1978 (RA-2009)	100 >	Min. 50
4	Flash Point, °C	IS :1209 - 1978 (RA-2009)	294	Min. 220

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Lab No: CTCE/BBMP/WS/103/KRIDL/BC/ADV/2014-15 24.04.2014

Aggregate Impact Value
IS: 2386 Part IV

Client	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	Technical Manager (West), KRIDL, Bangalore.
Name of the Work	Improvements of balance roads and drilling of borewells in G. Ramaiah Layout in Amur Ward No. 03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/475/2013-14 Dated: 12.02.2014
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	24.04.2014

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	384	386	
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	80	82	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	304	304	
4	Aggregate Impact value = percent fines $100 \times (W_2/W_1)$%	20.83	21.24	21.04

Comments:
- Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%.

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Lab No: CTCE/BBMP/WNo63/KRIDL-BC/AIV/2014-15 24.04.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Ban
Agency	Technical Manager (West), KRIDL, Bangalore
Name of the Work	Improvements of balance roads and drilling of borewells in G. Ramaiah Layout in Attur Ward No. 63 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/475/2013-14 Dated: 12.02.2014
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	24/04/2014

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	382	385	
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	82	84	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	300	301	
4	Aggregate Impact value = percent fines 100 (W_2 / W_1)%	21.47	21.82	21.64

Comments:

– Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%.

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Lab No: CTCE/BBMP/WNo.03/KRIDL/BC/AIV/2014-15 24.04.2014

Aggregate Impact Value
IS: 2386 Part IV

Client	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	Technical Manager (West), KRIDL, Bangalore
Name of the Work	Improvements of balance roads and drilling of borewells in G. Ramaiah Layout in Attur Ward No. 03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/475/2013-14 Dated: 12.02.2014
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	24.04.2014

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	385	387	
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	83	85	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	302	302	
4	Aggregate Impact value = percent fines $100 * (W_2/W_1)$ %	21.56	21.96	21.76

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Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%.

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DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Survey	**Technical Manager (West),** KRIDL, Bangalore.
Name of Work	Improvements of balance roads and drilling of borewells in G. Ramaiah Layout in Areas Ward No.03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/475/2013-14 Dated: 12.02.2014
Technical Reference	IS 2386(Part I): 1963 (RA 2007)
Type of Mix	Bituminous Concrete
Date of Testing	24.04.2014

Result : Flakiness Index = 11.15%

Elongation Index = 13.26%

Result : Combined Flakiness & Elongation index 24.41%

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30%

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Lab No : CTCE/MMP/WS-03/KRIDL/BC/Stage_I/2014-15 24.04.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	Technical Manager (West), KRIDL, Bangalore.
Name of Work	Improvements of bituose roads and drilling of borewells in G. Ramaiah Layout in Attur Ward No. 03 of Yelahanka satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/475/2013-14 Dated: 12.02.2014
Technical Reference	IS 2386(Part I) 1963 (RA 2007)
Type of Mix	Bituminous Concrete
Date of Testing	24.04.2014

Result : Flakiness Index = 11.42%

Elongation Index = 13.64%

Result : Combined Flakiness & Elongation index 25.06%

Comments:

- Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30%.

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Job No: CTCL/BBMP/WS-03/KRIDL/JE/Shopc_1/2014-15 24.04.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, Bangalore
Name of Work	Improvements of balance roads and drilling of borewells in G. Ramaiah Layout in Ward No. 03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/475/2013-14 Dated: 12.02.2014
Technical Reference	IS 2386(Part I) 1963 (RA 2007)
Type of Mix	Bituminous Concrete
Date of Testing	24.04.2014

Result : Flakiness Index = 11.49%

Elongation Index = 13.70%

Result : Combined Flakiness & Elongation index 25.19%

Comments:

- Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30 -

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Job No: CTCE/BBMP/ W No:05/KRIDL-BC/Stripping/2014-15 25.04.2014

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Client	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	Technical Manager (West), KRIDL, Bangalore
Name of the work	Improvements of balance roads and drilling of borewells in G. Ramaiah Layout in Amur Ward No. 03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/475/2013-14 Dated: 12.02.2014
Type of Mix	Bituminous Concrete
Date of Testing	25.04.2014

Type of binder : 60/70
Percentage of binder used : 5.0% by Wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	2.5	2.63	97.37
2	2.6		
3	2.8		

Comments:

→ Minimum allowable Aggregate retained coating for Bituminous Concrete is 95%.

Note:

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Job No: CTCE/BBMP/WNo.60/KRIDL/RC/Sp_Wa/2014-15 25.04.2014

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Client	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	Technical Manager (West), KRIDL, Bangalore.
Name of the Work	Improvements of balance roads and drilling of borewells in G. Ramaiah Layout in Amur Ward No. 03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/475/2013-14 Dated: 12.02.2014
Type of Mix	Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	25.04.2014

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2022	2023	2026	
2	Weight of basket suspended in water	W_2 g	750	750	750	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_3$ g	1272	1273	1276	
4	Weight of saturated surface dry aggregate in air	W_4 g	2041	2043	2046	
5	Weight of water equal to the volume of the aggregate	$(W_4 - W_3)$ g	769	770	770	
6	Weight of oven dried aggregate	W_5 g	2022	2022	2026	
7	Specific Gravity	$W_5/(W_4-W_3)$	2.629	2.626	2.631	2.629
8	Apparent Specific gravity	$W_5/(W_5-W_3)$	2.696	2.700	2.701	2.699
9	Water Absorption	$(W_4-W_5)*100/W_5$	0.94%	1.04%	0.99%	0.99%

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%

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Lab No : CTCE/BBMP/W No.03/KRIDL/BC/Gradation/2014-15 25.04.2014

GRADATION DETERMINATION OF BITUMINOUS CONCRETE MIX

As per IS : 2386 and IRC : SP : 11 - 1984

CLIENT	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
AGENCY	Technical Manager (West), KRIDL, Bangalore.
NAME OF THE WORK	Improvements of balance roads and drilling of borewells in G. Ramaiah Layout in Amur Ward No. 03 of Yelahanaka Satellite Town Sub Division, BBMP, Bangalore.
REFERENCE	BBMP/AEE/YSSD/475/2013-14 Dated: 12.02.2014
SAMPLE I/D	Roads in G. Ramaiah Layout in Amur Ward No. 03
DATE OF TESTING	25.04.2014

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	28.12	5.56	5.56	94.44	90-100
4.75	248.96	53.03	58.59	41.41	35-51
2.36	54.32	11.57	70.16	29.84	24-39
1.18	51.26	10.92	81.08	18.92	15-30
0.3	28.79	6.13	87.21	12.79	9-19
0.075	37.98	8.09	95.30	4.70	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	33.68	7.16	7.16	92.84	90-100
4.75	259.87	55.23	62.39	37.61	35-51
2.36	56.32	11.97	74.36	25.64	24-39
1.18	42.15	8.96	83.32	16.68	15-30
0.3	25.59	5.46	88.78	11.22	9-19
0.075	30.27	6.43	95.21	4.79	3-8

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Job No:CTCE/BBMP/WNoGV/KRIDL/BC/AGG/2014-15 25.04.2014

Aggregate Gradation Test

IS : 2386 Part I

Client	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	Technical Manager (Wcso), KRIDL, Bangalore.
Name of the Work	Improvements of balance roads and drilling of borewells in G. Rampalli Layout in Amur Ward No. 03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference	BBMP/AEE/YSSD/475/2013-14 Dated: 12.02.2014
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete (BC)
Date of Testing	25.04.2014

Total Weight of Sample: **5650** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade II MORTH specifications
9.5	458	8.1	8.11	91.89	90-100	
4.75	2982	52.8	60.88	39.12	35-51	
2.36	783	13.9	74.74	25.26	24-39	
1.18	451	8.0	82.73	17.27	15-30	
0.3	386	6.8	89.56	10.44	9-19	
0.075	325	5.8	95.31	4.69	3-8	

Total Weight of Sample: **5600** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade II MORTH specifications
9.5	375	6.7	6.70	93.30	90-100	
4.75	2962	52.9	59.59	40.41	35-51	
2.36	629	11.2	70.82	29.18	24-39	
1.18	434	7.8	78.57	21.43	15-30	
0.3	345	6.2	84.73	15.27	9-19	
0.075	495	8.8	93.57	6.43	3-8	

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Job No: CTCE/BBMP/WN-03/KRIDL/BC/Stability/2014-15 25-03-2014

TEST REPORT ON STABILITY OF MIX

Client	:	Asst. Executive Engineer, Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Agency	:	Technical Manager (West), KRIDL, Bangalore.
Name of the Work	:	Improvements of balance roads and drilling of borewells at G. Ramaiah Layout in Amar Ward No. 03 of Yelahanka Satellite Town Sub Division, BBMP, Bangalore.
Reference		BBMP/AEE/YSSD/475/2013-14 Dated: 12.02.2014
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	25.03.2014

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	10.65	9.70	9 Kn (min)
2	Marshal flow, mm	3.10	3.15	2 – 4
3	Percent air voids in Mineral Aggregate	14.25	13.40	13 – 15
4	Voids in Compacted Mix	4.30	3.85	3 – 6
5	Percent Voids filled with Bitumen	69.85	70.10	65 – 75
6	Density, g/cc	2.26	2.27	--

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⇒ Any Query regarding the report must be reported within 30 days from the date of testing.

25-3-14

M/s. Civil-Tech Consultants & Engineers

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